

CLAIMS

I claim:

1. A hitch extension apparatus for attaching an implement to a tractor drawbar for towing in an operating travel direction, the tractor drawbar defining a drawbar hole, wherein the implement comprises a drive shaft having a rear universal joint at a rear end thereof connected to a driveline of the implement, and a front universal joint at a front end thereof adapted for attachment to a tractor power take off, the apparatus comprising:

a first member adapted for attachment to the tractor drawbar by insertion of a drawbar pin through the drawbar hole and through at least one corresponding draw pin hole defined by the first member, the first member configured such that same is substantially fixed with respect to the drawbar when the drawbar is placed in a drawbar location of the apparatus and the drawbar pin is inserted;

an extension member pivotally attached to the first member about a substantially horizontal pitch axis oriented substantially perpendicular to the operating travel direction, and pivotally attached to the first member about a substantially horizontal roll axis oriented substantially parallel to the operating travel direction;

wherein the extension member defines a pivotal attachment location at a rear end thereof rearward of the draw pin hole adapted for pivotal attachment of the implement about a substantially vertical yaw axis located substantially equidistant from the front and rear universal joints when the drive shaft is connected to the tractor power take off.

2. The apparatus of Claim 1 wherein the first member comprises a sleeve adapted to slide over the draw bar, and defines top and bottom draw pin holes.

3. The apparatus of Claim 1 wherein the extension member comprises:

a pitch member pivotally attached to the first member about the pitch axis;

a roll member pivotally attached to the pitch member about the roll axis; and

wherein the roll member defines the pivotal attachment location at a rear end thereof adapted for pivotal attachment of the implement about the yaw axis.

4. The apparatus of Claim 1 wherein the extension member comprises:

a roll member pivotally attached to the first member about the roll axis;

a pitch member pivotally attached to the roll member about the pitch axis; and

wherein the pitch member defines the pivotal attachment location at a rear end thereof adapted for attachment of the implement about the yaw axis.

5. The apparatus of Claim 3 further comprising a pin extending from each side of the sleeve coincidental with the pitch axis, and wherein the pin extends through a corresponding hole defined by the pitch member on each side of the sleeve.
6. The apparatus of Claim 5 wherein the pitch member comprises a cross-plate located rearward of the sleeve and oriented substantially parallel to the pitch axis, and wherein the roll member is pivotally attached to the cross-plate about the roll axis.
7. The apparatus of Claim 1 wherein the pitch axis is oriented such that the pitch axis passes through or below the drawbar location.

8. The apparatus of Claim 1 wherein the pitch axis is located forward of the yaw axis.
9. The apparatus of Claim 1 wherein the pitch axis is located forward of the draw pin hole.
10. A rotary mower apparatus for attachment to a tractor drawbar for towing in an operating travel direction, the tractor drawbar defining a drawbar hole, the apparatus comprising:

a sleeve adapted for attachment to the tractor drawbar by insertion of a draw pin through the drawbar hole and through at least one corresponding draw pin hole defined by the sleeve, the sleeve configured such that same is substantially fixed with respect to the drawbar when the drawbar is in a drawbar location of the apparatus and the drawbar pin is inserted;

an extension member pivotally attached to the sleeve about a substantially horizontal pitch axis oriented substantially perpendicular to the operating travel direction, and pivotally attached to the sleeve about a substantially horizontal roll axis oriented substantially parallel to the operating travel direction;

a rotary mower unit comprising a drive shaft having a front universal joint adapted for connection to a power take off of the tractor, and a rear universal joint connected to a driveline of the rotary mower unit;

wherein a front end of the rotary mower unit is pivotally attached to the extension member about a substantially vertical yaw axis located substantially equidistant from the front and rear universal joints when the drive shaft is connected to the tractor power take off.

11. The apparatus of Claim 10 wherein the extension member comprises:

a pitch member pivotally attached to the sleeve about the pitch axis;

a roll member pivotally attached to the pitch member about the horizontal roll axis;

wherein the rotary mower unit is pivotally attached to a rear end of the roll member about the yaw axis.

12. The apparatus of Claim 10 wherein the extension member comprises:

a roll member pivotally attached to the sleeve about the roll axis;

a pitch member pivotally attached to the roll member about the pitch axis; and

wherein the rotary mower unit is pivotally attached to a rear end of the pitch member about the yaw axis.
13. The apparatus of Claim 11 further comprising a pin extending from each side of the sleeve coincidental with the pitch axis, and wherein the pin extends through a corresponding hole defined by the pitch member on each side of the sleeve.
14. The apparatus of Claim 13 wherein the pitch member comprises a cross-plate located rearward of the sleeve and oriented substantially parallel to the pitch axis, and wherein the roll member is pivotally attached to the cross-plate about the roll axis.
15. The apparatus of Claim 10 wherein the pitch axis is oriented such that the pitch axis passes through or below the drawbar location.

16. The apparatus of Claim 10 wherein the pitch axis is located forward of the yaw axis.
17. The apparatus of Claim 10 wherein the pitch axis is located forward of the draw pin hole.